الدرس الأول
ساينس

الصف الأول الإعدادي

إعداد أ/ ياسمين سرور

MATTER AND ITS COMPONENTS

Matter: Matter is anything that has mass and volume.

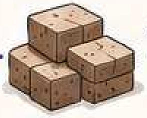
Matter is made up of molecules, and molecules are made up of atoms.

(The atom is the basic building unit of all living organisms and matter.)

Example: Abu El-Houl (The Sphinx)



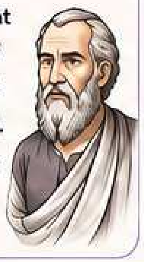
Limestone ← consists of → Calcium Carbonate



ATOMIC STRUCTURE (HISTORICAL DEVELOPMENT)

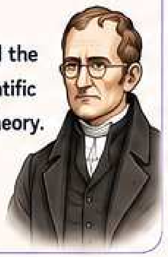
Greek Philosophers

- They believed that matter is made of tiny particles that cannot be divided.
- They called these particles Atoms.



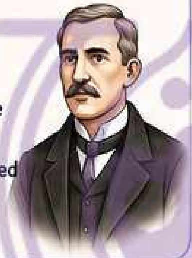
Dalton

- Proposed the first scientific atomic theory.



Rutherford

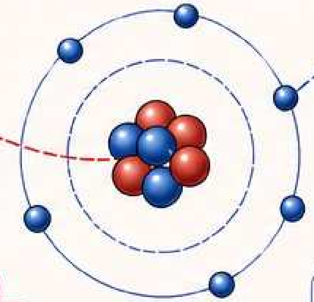
- Proposed the first experimental model of the atom.
- Won the Nobel Prize in Chemistry.
- His picture was printed on New Zealand's largest banknote.



BASIC COMPONENTS OF THE ATOM

First: The Nucleus

- A very small region at the center of the atom.
- Contains:
  - Positively charged protons (+).
  - Neutral neutrons (0).



Second: Electrons

- Extremely small particles with negligible mass.
- Move around the nucleus in energy levels.
- Carry a negative (-) charge.

Why is the nucleus positively charged?

Answer: *Because it contains positively charged protons, while neutrons have no charge.*

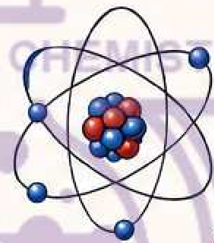
Why is most of the atom's mass concentrated in the nucleus?

Answer: *Because the electron's mass is negligible compared with the masses of the proton and neutron.*

COMPARISON BETWEEN ATOMIC PARTICLES

Particle	Symbol	Mass	Charge
Proton	(P)	1 u	+1
Neutron	(N)	1 u	0
Electron	(e)	$\frac{1}{1836}$ u	-1

IMPORTANT NOTES AND RULES



- Mass of the proton = Mass of the neutron = 1836 × the mass of the electron.
- The proton and electron have equal charge magnitude but opposite signs.
- The electron has negligible mass.
- The neutron has no electric charge.
- Rule: Number of protons = Number of electrons.

Why is the atom electrically neutral?

Answer: Because the number of positively charged protons equals the number of negatively charged electrons.

CHEMICAL ELEMENTS AND THEIR SYMBOLS



Scientists agreed to represent chemical elements using symbols to make writing chemical equations easier.

Note (1)

If the Latin name is similar to the English name, the symbol is taken from the English name.

Element	English Name	Symbol
Carbon	Carbon	C
Nitrogen	Nitrogen	N

Note (2)

If the Latin name differs from the English name, the symbol is taken from the Latin name.

English Name	Latin Name	Symbol
Sodium	Natrium	Na
Copper	Cuprium	Cu

CHEMICAL ELEMENTS SYMBOLS TABLE

Element	Symbol
Hydrogen	H
Helium	He
Mercury	Hg
Oxygen	O
Fluorine	F
Iron	Fe
Phosphorus	P

Element	Symbol
Lead	Pb
Sulfur	S
Silicon	Si
Potassium	K
Magnesium	Mg
Lithium	Li
Zinc	Zn

Element	Symbol
Nitrogen	N
Neon	Ne
Sodium	Na
Boron	B
Beryllium	Be
Bromine	Br
Iodine	I

Element	Symbol
Carbon	C
Calcium	Ca
Chlorine	Cl
Copper	Cu
Chromium	Cr
Argon	Ar
Aluminium	Al
Gold	Au
Silver	Ag

FERTILIZERS

Definition:
Fertilizers are chemical substances used to improve agricultural production.

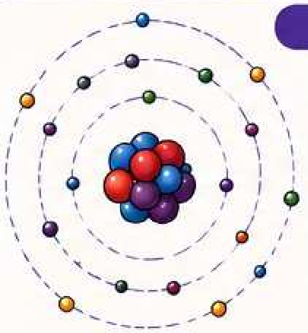
NPK

One of the most common fertilizers: NPK Fertilizer

- **K** (Potassium): Promotes healthy plant growth.
- **P** (Phosphorus): Strengthens the roots.
- **N** (Nitrogen): Increases leaf growth.

Note:
Excessive use of fertilizers may be harmful to: Humans, Animals, Plants

ENERGY LEVELS



Definition:
Energy levels are regions around the nucleus where electrons move.

There are seven main energy levels.

Order of Energy Levels

K, L, M, N, O, P, Q

Rule for Calculating the Maximum Number of Electrons

Maximum number of electrons in the principal energy level: $2n^2$
(n = principal energy level number)

K level	→ 2×1^2 =	2 electrons
L level	→ 2×2^2 =	8 electrons
M level	→ 2×3^2 =	18 electrons
N level	→ 2×4^2 =	32 electrons

Note:
- Each principal energy level consists of several sublevels.
- The energy of the levels increases as the distance from the nucleus increases.

K < L < M < N

ELECTRON DISTRIBUTION RULES

How are electrons distributed among energy levels?

Electrons fill the lowest-energy level first.

Rules for Easy Electron Distribution

If the atom has 1 or 2 electrons, they are placed only in K. →	If the number of electrons = 1 or 2
If the atom has 3 – 10 electrons, distribute them between K and L. →	If the number of electrons = 3 to 10 (3) (4) (5) (6) (7) (8) (9) or (10)
If the atom has 11 – 18 electrons, distribute them among K, L, and M. →	If the number of electrons = 11 to 18 (11) (12) (13) (14) (15) (16) (17) or (18)
If the atom has 19 or 20 electrons, distribute them among K, L, M, and N. →	If the number of electrons = 19 or 20

Examples of Electron Configuration

Sodium (Na) — 11 Na
Atomic Number = 11
Electron Configuration
K: 2, L: 8, M: 1

Chlorine (Cl) — 17 Cl
Atomic Number = 17
Electron Configuration
K: 2, L: 8, M: 7

Calcium (Ca) — 20 Ca
Atomic Number = 20
Electron Configuration
K: 2, L: 8, M: 8, N: 2

BASIC RULES OF THE ATOM (SYMBOL X)

$^{A}_{Z}X$

A (Mass Number)
Mass Number = Number of Protons + Number of Neutrons
(Total number of nucleons)

Z (Atomic Number)
Atomic Number = Number of Protons
= Number of Electrons

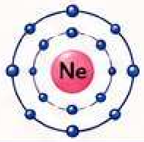
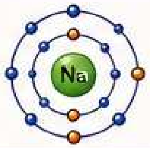
Formula:
Number of Neutrons = A – Z

Why is the mass number usually greater than the atomic number?

Answer: Because the mass number includes both protons and neutrons, while the atomic number represents only the number of protons.

Prepared by: Ms. Yasmeen Srour | 01558180129

COMPARISON TABLE OF ELECTRON CONFIGURATIONS

Element	Electron Configuration		Protons	Electrons	Number of Energy Levels
Neon (Ne)		K: 2, L: 8 (Total = 10)	10	10	2
Sodium (Na)		K: 2, L: 8, M: 1 (Total = 11)	11	11	3

PRACTICE PROBLEMS AND APPLICATIONS

Example (1)

Question:
An element X contains 40 nucleons, and its electrons are distributed in 3 energy levels. The outermost level contains 8 electrons. Find:
- The atomic number.
- The number of neutrons.

Solution:
- Mass Number = Number of Nucleons = 40
- Electron configuration: K: 2, L: 8, M: 8
- Total number of electrons = 18
  → Therefore, Atomic Number = 18
- Number of Neutrons = Mass Number − Atomic Number
  → 40 − 18 = 22 neutrons

IMPORTANT NOTES

Why does the mass number equal the atomic number?	**Answer:** When the atom contains no neutrons.
Note:	Isotopes have: • The same number of protons. • Different numbers of neutrons.
Rule:	When only the isotope symbol is written (without the atomic number), the number shown represents the mass number.
Example:	Oxygen-17 — 17 is the mass number. (^{17}O)
Question:	Can the number of neutrons be determined from this notation alone?
Answer:	No, because the atomic number is not given.

Example (2)

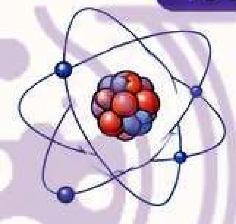
Question:
The element Astatine has several isotopes, including Astatine-210, which has 85 electrons.
Find:
- Mass Number
- Atomic Number
- Number of Neutrons

$^{210}_{85}At$

Solution:
- **A** Mass Number (A) = 210
- **Z** Atomic Number (Z) = 85
- **N** Number of Neutrons (N) = 210 − 85 = 125

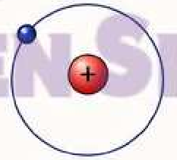
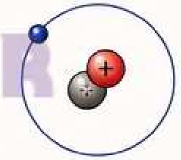
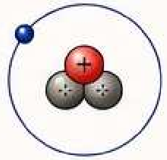
Element Symbol: At
(The atomic number is written at the lower left, and the mass number at the upper left of the element symbol.)

ISOTOPES (DEFINITION AND EXAMPLES)



Definition:
Isotopes are different forms of atoms of the same element.
They have:
- The same atomic number.
- Different mass numbers.

HYDROGEN ISOTOPES

Protium (^1_1H)	Deuterium (^2_1H)	Tritium (^3_1H)
		
• Atomic Number = 1 • Number of Neutrons = 0	• Atomic Number = 1 • Number of Neutrons = 1	• Atomic Number = 1 • Number of Neutrons = 2
^1_1H	^2_1H	^3_1H


موقع الدكتور
محمد رزق
التعليمي
امسح الباركود بالموبيل لتثبيت
التطبيق وتحميل كل الملازم مجانا وبسرعه
MR
حمل التطبيق الأن
GET IT ON
Google Play
ملازم ابتدائي
ملازم اعدادي
ملازم ثانـــوي
كورسات ونتائج امتحانات